

REMARKS

By the present amendment, claims 19-24 are pending in the application.

Support For Claim Amendments

The amendment to independent claims 19, 20, 21 and 22 directed to --with said reinforcing ribs located entirely external to the surface of said structural member-- is supported, e.g., in Fig. 25 (plan view of Fig. 3); Fig. 27 (plan view of Fig. 6) and Fig. 29 (plane view of Fig. 7). See description of Figs. 25, 27 and 29 at page 5. Fig. 7 is a V-shape embodiment. See page 8, line 37 to page 9, line 2.

Support for the amendment to independent claims 19, 20, 21 and 22 directed to --and a second end of said reinforcing ribs opposite to said first end is located adjacent to said base plate or coupling flange-- may be seen in the drawings, e.g., Figs. 1-3 and Figs. 6-7.

Support for new dependent claims 23 and 24 may be found in the specification at page 13, lines 26-31.

New matter is not being presented by the present amendment.

Interview

The applicants and the applicants' attorney thank the Examiner for the courtesy of the interview on August 10, 2004.

The contents of the Interview Summary (PTOL-413) are agreed to. There is one minor inadvertent error in the Interview Summary. The box Telephonic is marked with an X.

The interview was Personal and a copy of the Interview Summary was given to the applicants' representative.

During the interview, the Examiner had a copy of the claims of the present amendment for comparison of these claims with the prior art that was discussed during the interview.

Two minor changes have been made to the claims. Dependent claim 23 is now dependent on claim 21. Dependent claim 24 is now dependent on claim 22.

In the interview, the Examiner was shown a model of the embodiment of the present invention illustrated in Fig. 2 of the present application and a model of Fig. 2 of cited Japan No. 50-77653.

The Examiner was also provided with a full English language translation of Japan No, 50-77653. A copy of this English language translation is attached.

It was pointed out that in Japan No. 50-77653, there are bores 10a, 10b in web portion 5a of H beam 5. Rib plates 9 pass through the web portion 5a. See, e.g., Figs. 2 and 3 of JP `653. The purpose of rib plates 9 in JP `653 is to compensate for the lost material in web portion 5a due to the bores 10a, 10b.

In the present invention, the reinforcing ribs are located entirely external to the surface of the structural member. The purposes of the reinforcing ribs of the present invention is to join the structural member to the base plate or coupling flange and to transfer bending force between the structural member and the base plate or coupling flange.

The references cited in the Information Disclosure Statement filed April 8, 2004 (Certificate of Mailing dated April 6, 2004) were also discussed in the interview.

It was agreed that U.S. Patent No. 4,602,463 and the Abstract of Japan No. 11-117245 of this Information Disclosure Statement were not relevant to the claims of the present amendment.

With respect to U.S. Patent No. 3,113,760, it was pointed out that the U-shaped member of Fig. 7 of US `760 had a different orientation with respect to the base plate and columnar member than the U-shaped reinforcing ribs of the present invention.

It was agreed at the interview that the claims of the present amendment are patentably distinguishable over the prior art discussed during the interview.

Office Action

In the Office Action mailed April 13, 2004, claims 19-22 were rejected under 35 U.S.C. §102(b) as being anticipated by Japan No. 50-77653.

This rejection, as applied to amended independent claims 19-22 and new dependent claims 23 and 24, is respectfully traversed.

It is submitted that amended independent claims 19-22 and new dependent claims 23 and 24 are patentable for the reasons set forth in the above discussion of the interview.

CONCLUSION

It is submitted that in view of the present amendment and foregoing remarks, the application is now condition for allowance. It is therefore respectfully requested that the application, as amended, be allowed and passed to issue.

Respectfully submitted,

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Translation of Japan No. 50-77653 (Utility Model)

1. Title of the Invention:

Bolt for joining core boxes

2. Scope of Claim:

A bolt for joining core boxes, comprising a bolt body having threaded portions formed at both ends of a shaft portion, the threaded portions having a diameter smaller than that of the shaft portion, and a cap that is screwed onto the threaded portion and having an outer diameter nearly equal to, or smaller than, that of the shaft portion, and having a portion that is tapered at an end on the outer periphery thereof.

3. Detailed Description of the Invention:

This invention relates to a bolt for joining core boxes used for building up a high-rise building by stacking core boxes.

When it is attempted to build up a high-rise building by stacking box-shaped core boxes of a bearing structure incorporating dwelling facilities such as kitchen, toilet, bath room, etc. therein, and coupling and securing them together so that the core boxes work as skeletal members, it is required to simply and strongly stack and join the core boxes. When the junction is accomplished by welding, however, a laborious work is required, which is not advantageous from the standpoint of simplifying and facilitating the construction. When it is attempted to join them together by using bolts, it is not allowed to fasten the bolts from the interior of the boxes since the individual core boxes have been constituted as box-shaped finished products incorporating the dwelling facilities therein. Namely, a generally employed bolt junction system cannot be utilized.

As illustrated in Figs. 1 to 3, therefore, the present inventors have proposed a core box junction system in which

each core box 1 is constituted by H-steel beams 5 arranged at four corners, beams 6, floors 7 and walls 8 to constitute a kitchen 2, a bath room 3, a toilet 4, etc., the H-steel beams 5 are of a structure forming bores 10a, 10b reinforced with rib plates 9 at the ends of web portions 5a, a base plate 12 and a top plate 13 are secured to the upper end lower ends of the H-steel beam 5, bolt insertion holes 11, 11 are formed at the central portions of the base plate 12 and of the top plate 13, the core boxes are stacked to build up a high-rise building by using the core boxes 1, 1, and dwelling-constituting units 15, 15 as illustrated in Fig. 4, wherein a bolt 14a that is threaded at its both ends is inserted in the bolt insertion hole 11 of the top plate 13 in the lower core box so as to be screwed onto the lower nut 14b that has been fitted in advance in the bores 10b in the upper part of the beam and, then, the core box of the upper side is placed such that the bolt insertion hole 11 at the lower part of the beam is fitted to the bolt 14a, followed by fastening the nut 14c of the upper side, so as to secure the two core boxes. When the upper core box is placed on the lower core box, however, it is very difficult to bring the bolt 14a protruded in the lower core box into alignment with the bolt insertion hole 11 in the upper core box, requiring difficult crane operation. Besides, the bolts are often damaged by the core box of the upper side making it difficult to fasten the nuts. Therefore, the above bolt junction system could not be employed.

This invention was accomplished in view of the above-mentioned circumstances, and its object is to provide a bolt for joining core boxes, which makes it possible to safely, reliably and efficiently join the core boxes relying on the above bolt junction system, and facilitates the positioning of the core boxes without damaging the bolts.

An embodiment of the invention will now be described with reference to the drawings.

In Figs. 5 to 7, reference numeral 21 denotes a body of high tension bolt which has a shaft portion 22 of a large

diameter in the intermediate portion thereof and threaded portions 23a, 23b protruded from both ends of the shaft portion 22 and having a diameter smaller than that of the shaft portion 22. The peripheral edges at both ends of the shaft portion 22 are rounded to form round portions 22a of a suitable diameter. Reference numeral 24 denotes a cap which is screw-fitted onto the threaded portion 23a of the bolt body 21. The cap 24 has an outer diameter nearly equal to that of the shaft portion 22 of the bolt body 21, and its outer periphery at the end is tapered as designated at 24a so as to become narrow, and has its inner periphery internally threaded as designated at 25 so as to be screwed onto the threaded portion 23a, has an opening 26 of a diameter smaller than the internally threaded portion 25 at an end thereof, and has a plurality of small holes 27, 27 penetrating through the peripheral wall at the opening.

Referring to Fig. 8, the bolt is inserted at its threaded portion 23b of the side without the cap 24 in the bolt insertion hole 11 in the top plate 13 secured to the H-steel beam 5 of the core box, is screwed into a lower nut 28b that has been fitted in advance in the bore 10b formed in the upper web portion 5a of the H-steel beam 5, is placed on the bolt support plate 30 horizontally secured between the reinforcing rib plates 9 provided surrounding the bore 10b, and is mounted on the core box in a state where a portion thereof on the side of the cap 24 is protruded beyond the top plate 13 up to nearly one-half the shaft portion 22 thereof.

To join the core box of the upper side on the above core box as illustrated in Fig. 9, the core box of the upper side is placed on the core box of the lower side in a manner that the bolt insertion hole 11 in the base plate 12 secured to the H-steel beam 5 of the core box of the upper side is fitted to an end of the bolt that is mounting the cap 24 and is protruding from the core box of the lower side, and that the bolt insertion hole 11 in the base plate 12 is fitted to the shaft portion 22 of the bolt body while being guided by the taper portion 24a of the cap 24 to protect the threaded

portion 23a by the cap 24. The upper and lower core boxes are thus joined together. Thereafter, the cap 24 is removed by hand inserted through the bore 10a reinforced by the reinforcing rib plates 9 provided in the H-steel beam 5 of the core box of the upper side, and the threaded portion 23a of the bolt body 2 is exposed. Then, as illustrated in Fig. 10, the upper nut 28a is screwed and tightened, so that the core box placed thereon is firmly coupled and joined thereto. Here, the bore 10a of the lower side of the H-steel beam 5 is formed maintaining a considerable depth so that the cap 24 can be easily removed.

In the above embodiment, the outer diameter of the cap 24 is nearly equal to that of the shaft portion 22 of the bolt body 21. Here, however, the outer diameter of the cap 24 may be smaller than the above diameter. In this case, the bolt insertion hole 11 that fits to the bolt being guided by the cap 24, is guided by the rounded portion 22a of the shaft portion 22 continuous from the lower end of the cap, and is reliably fitted to the shaft portion 22.

Being constituted as described above, damage to the threaded portion is prevented owing to the cap 24 mounted on the bolt protruded from the core box of the lower side at the time of joining the bolt of the core box. Further, the cap 24 makes it possible to easily and efficiently accomplish the positioning between the bolt and the bolt insertion hole 11 in the core box of the upper side.

4. Brief Description of the Drawings:

Fig. 1 is a perspective view of a core box;

Fig. 2 is a front view illustrating, on an enlarged scale, a major portion in a state of bolt junction;

Fig. 3 is a sectional view along the line V - V in Fig. 2;

Fig. 4 is a perspective view schematically illustrating a state where the core boxes are stacked one upon the other;

Fig. 5 is a vertical front view illustrating an embodiment of this invention;

Fig. 6 is a view illustrating, on an enlarged scale, a portion of the bolt body;

Fig. 7 is a sectional view of the cap; and

Figs. 8 to 10 are front views illustrating major portions in the steps of joining the core boxes by using the bolts in order of working procedure.

21 - bolt body 22 - shaft portion

23a, 23b - threaded portions 24 - cap

24a - tapered portion